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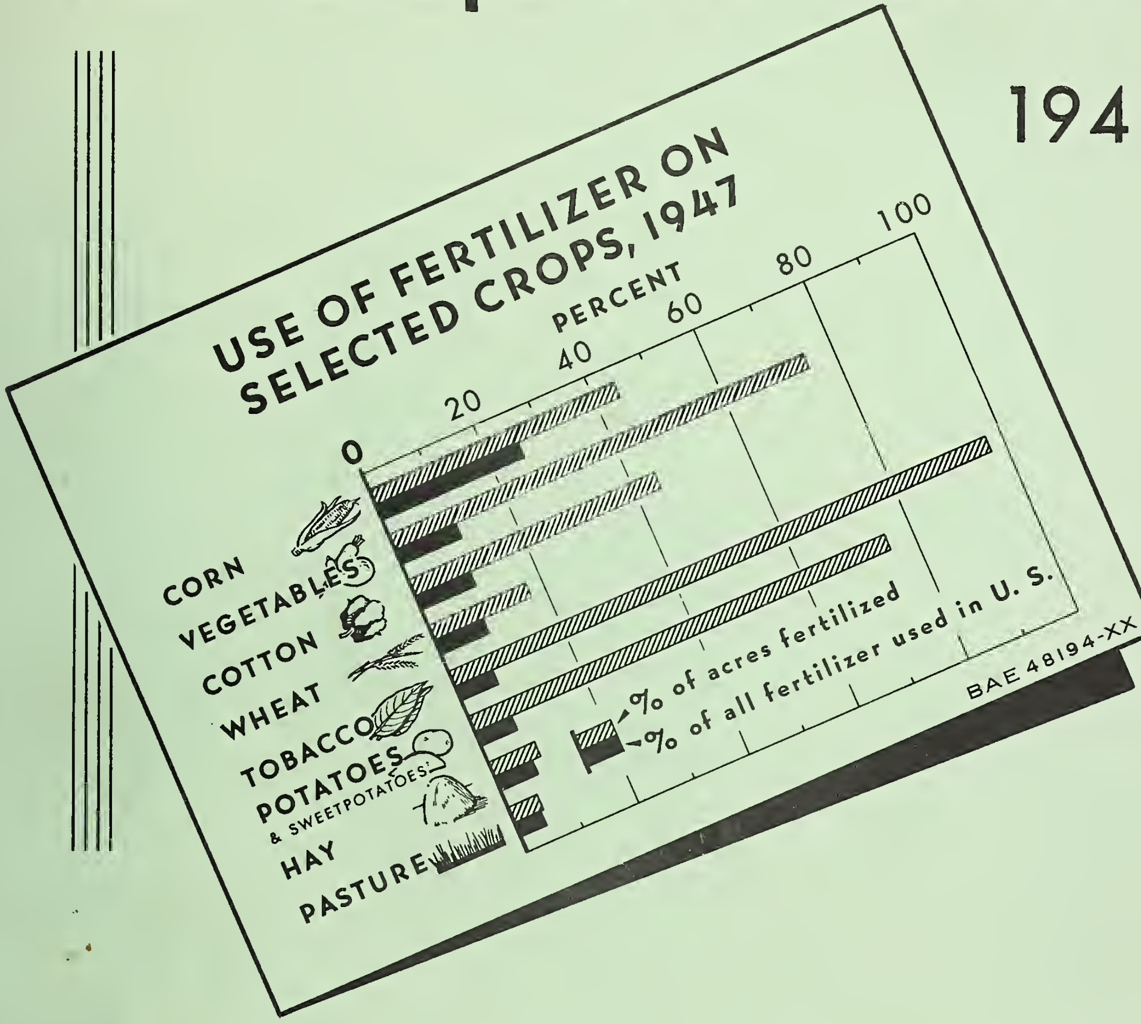
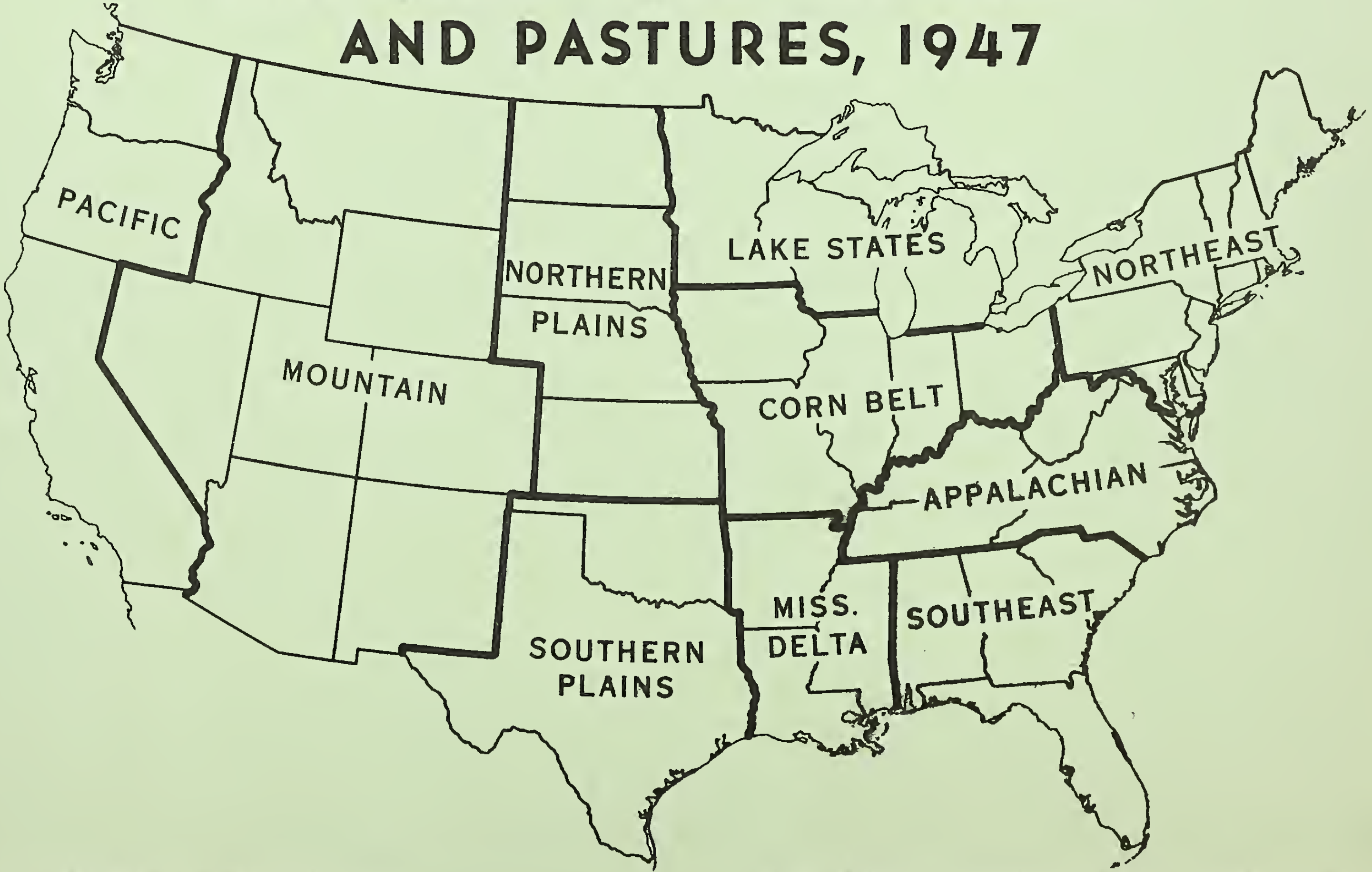
FERTILIZER *and* LIME used on Crops and Pasture

1947



UNITED STATES DEPARTMENT OF AGRICULTURE
Bureau of Agricultural Economics
WASHINGTON, D. C.
JUNE 1951

REGIONAL GROUPINGS OF STATES FOR DEVELOPING ESTIMATES OF FERTILIZERS AND LIME USED ON CROPS AND PASTURES, 1947



U. S. DEPARTMENT OF AGRICULTURE NEG. 48202-X BUREAU OF AGRICULTURAL ECONOMICS

FERTILIZER AND LIME USED ON CROPS AND PASTURE, 1947

By Donald B. Ibach and Robert E. Marx
Agricultural Economists

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The total quantity of commercial fertilizer manufactured and distributed to the different States is a matter of record. [1] Data covering this distribution in terms of both materials and plant nutrients contained therein have been available annually since 1928. Estimates of the quantity manufactured or handled by producers and distributors for the United States as a whole are available for a much longer period. In the case of lime, estimates of use on farms, by States, have been available annually since 1929. But until the survey covered by this report was conducted there had been no effort to obtain, by objective farm-sampling methods, estimates of the acreages of different crops fertilized, quantities of plant nutrients used, and the distribution of this use among crops by farmers. [2]

The use of fertilizer, in terms of plant nutrients, has increased to about 2 3/4 times the quantities used during the prewar period, 1935-39 (fig. 1). More than one-third of this increase occurred in the Corn Belt and Lake States, so that region now accounts for about one-fourth of the total consumption of fertilizer in the United States. During the prewar period less than 12 percent of the fertilizer was used in these States.

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[1] Agricultural Statistics from data developed by the Bureau of Plant Industry, Soils and Agricultural Engineering.

[2] Some valuable estimates have been obtained as a result of surveys of fertilizer practices conducted in 1928, 1938 and 1944 by the National Fertilizer Association, Washington, D.C. The Bureau of Agricultural Economics develops annual estimates of the use of fertilizer on cotton, based on information furnished by regular crop reporters in cotton-producing States.

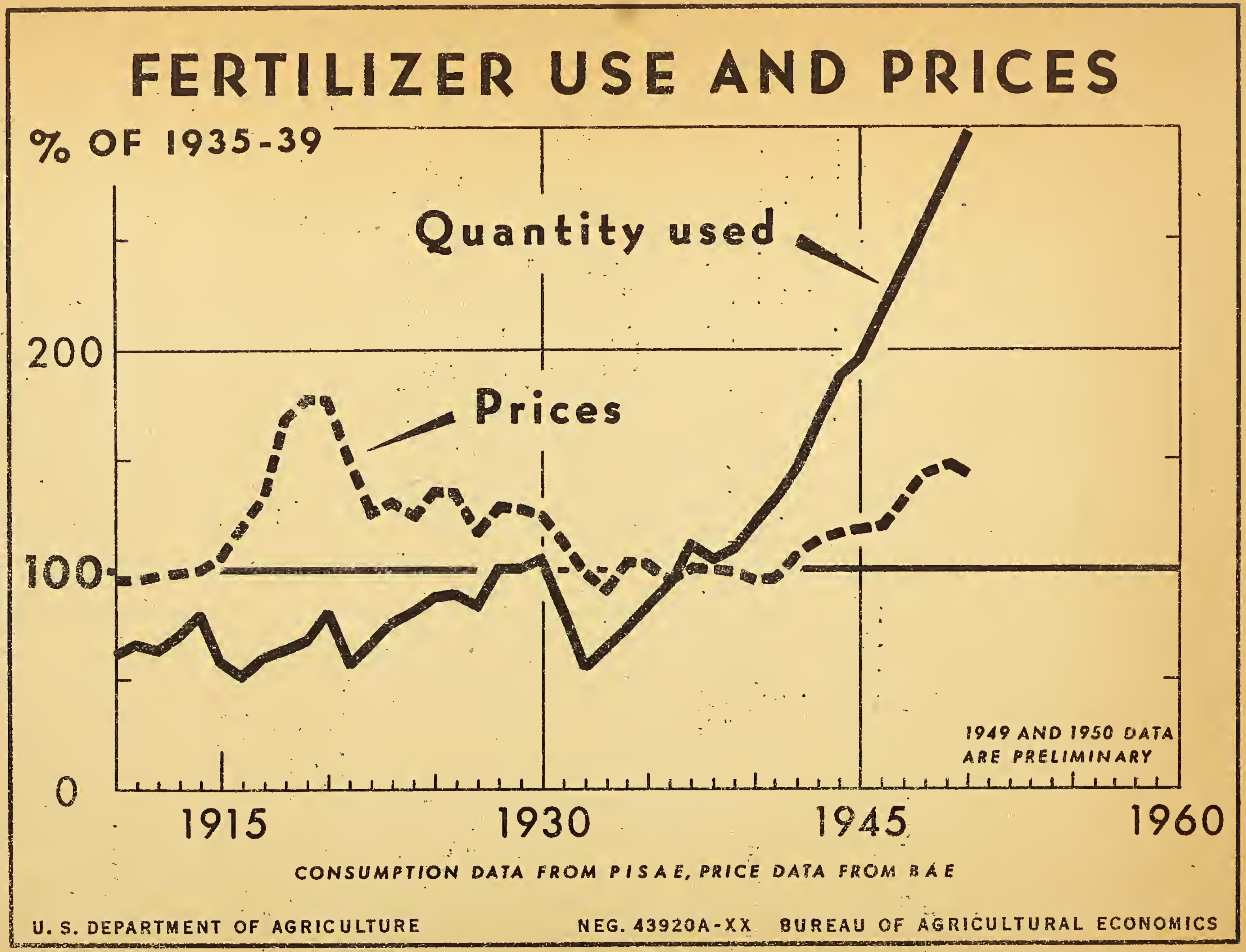
FERTILIZER USE AND PRICES
% OF 1935-39
200
100
0
Quantity used
Prices
1915
1930
1945
1960
1949 AND 1950 DATA ARE PRELIMINARY
CONSUMPTION DATA FROM P I S A E, PRICE DATA FROM B A E
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FIGURE 1

Increase in the use of fertilizers made a large contribution to the rise in farm production achieved during and following World War II. Crop-fertilizer price relationships have been such as to encourage the use of more fertilizer, in terms both of heavier rates per acre and of spread of the practice to include more acres.

FERTILIZER AND FARM PRODUCTION

Farm output (production for human consumption) in 1944 was 30 percent above the 1935-39 average. The use of fertilizer increased 87 percent during the same period. It has been estimated that 14 percent of the increase in output was attributable to the increase in the use of fertilizers. Other factors that contributed materially were more favorable weather, substitution of mechanical power for horses and mules, improved varieties of crops (particularly hybrid corn), and a substantial increase in livestock production. Part of the increase in livestock production reflects the influence of increased use of fertilizer on feed crops and pasture. This portion of the increase in output attributable to fertilizers is not included in the 14 percent indicated above. About 45 percent of the increase in output was attributed to increased crop production per acre and it was estimated that nearly one-third of this portion could be attributed directly to the additional fertilizer used in 1944, compared with the 1935-39 average. 3/

By 1949, farm output had risen to 40 percent above prewar, or 10 additional percentage points over the level reached in 1944. During the same period, fertilizer consumption rose about as much as it did from the prewar period to 1944. Further reduction in numbers of work stock of all ages indicates that about 35 percent of the 10-point rise in farm output (1949 over 1944) may be attributed to additional substitution of mechanical power for horses and mules. Livestock production in 1949 was substantially the same as in 1944. Apparently weather did not influence particularly the larger farm output in 1949 as compared with 1944. If the contribution per unit of fertilizer is assumed to be the same for the 2 years, the additional quantity used would account for about 40 percent of the 10-point increase in output. This would leave about 25 percent of the increase to be accounted for by better varieties and other improved production practices. Probably allowance should be made for the fact that some of the increase in fertilizer consumption has come about through increases in rates of application per acre. But much of the expansion has been on additional acres. Furthermore, on many crops, rates applied per acre in 1944, and even now, are sufficiently low so that substantial increments in yield are obtained with each additional unit applied. Therefore it seems conservative to estimate that increased fertilizer consumption, increased substitution of mechanical power, and further adoption of other improved practices probably shared about equally in the increase in farm output that has occurred since 1944.

3/ "Farm Production in War and Peace", BAE mimeographed publication F.M. 53, December 1945.

The relative contribution of fertilizer and lime in bringing about future needed increases in production will probably be greater than it has been in the past. Experimental evidence indicates that, with a few exceptions, much greater quantities of fertilizer than are now being used would generally add to the farmers' net returns, at price relationships that are comparable with those existing at present.

Average rates of application for most crops are far below rates that would be most profitable. For example, average rates of about 31, 14, and 9 pounds of N, P_2O_5, and K_2O, respectively, were applied on cotton in the Delta region in 1947. Analysis of summarized data from experiments conducted on short-leaf pine upland soils in Mississippi indicates that at 1950 cotton price-fertilizer cost relationships (after allowance for the costs of application and of handling the additional yield), rates of about 70, 140, and 70 pounds, of these nutrients in the order named above, would have been most profitable. 4/ These estimates are based on data from experiments in which a 4-8-4 fertilizer was applied. It is possible that a different relationship in the rates of N, P_2O_5, and K_2O might have been found most profitable if the three nutrients had been varied in independent series, each with basic rates of the other two at a sufficiently high level to permit full response to the single variable.

It is of course true that if all farmers adopted the most profitable practices (including fertilizer), the effect on production would be such that at any given time the cost-price structure would be materially altered. But changes in farming eventually follow adoption of practices that result in a more rapid increase in production of particular crops than is offset by changes in demand. The comparison between current rates of application of fertilizer and those that would be most profitable merely indicates the opportunities open to those who first adopt improved practices. Progress is made only by such action, and the adoption of improved practices with respect to fertilizer must be accepted, as are improvements in crop varieties, in mechanization, and in other practices that result in increased yields per acre.

FARMS, CROPLAND, AND PASTURE, RECEIVING APPLICATIONS, BY REGIONS

Estimates developed from the April 1948 Enumerative Survey conducted by the Bureau of Agricultural Economics are presented here on a regional basis. The grouping of States by regions is shown in figure 1.

Number and Percentage of Farms Using Fertilizer

Fertilizer was applied to cropland on about 56 percent of our farms, or on 3 1/3 million farms, and lime was applied to cropland on about 1 million farms in 1947 (table 1). These numbers are essentially the total number of farms on which any fertilizer or lime was used as only in rare instances were applications indicated on pasture alone.

4/ Based on data from experiments conducted since 1925 as reported in Miss. Agr. Expt. Sta. Bul. 342, April 1940.

Table 1.- Estimated number and percentage of farms using fertilizer and lime on all crops and on pasture, by regions, 1947 1/

Region	Farms using materials on crops				Farms using materials on pasture			
	Using fertilizer		Using lime		Using fertilizer		Using lime	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Northeast	363,900	66.0	211,200	38.3	38,000	6.9	55,700	10.1
Corn Belt and Lake States	856,500	53.0	512,300	31.7	50,100	3.1	82,400	5.1
Appalachian	777,300	73.0	170,400	16.0	86,300	8.1	101,100	9.5
Southeast	600,700	89.0	68,300	10.2	18,200	2.7	41,200	6.1
Delta	430,300	71.0	40,000	6.6	15,800	2.6	45,400	7.5
Southern Plains	167,400	30.0	11,200	2.0	26,200	4.7	17,900	3.2
Northern Plains	51,400	13.0	25,300	6.4	1,200	0.3	1,600	0.4
Mountain	43,500	20.0	3,500	1.6	3,300	1.5	1,100	0.5
Pacific	91,500	32.0	27,400	9.6	7,400	2.6	7,700	2.7
United States	3,382,500	56.7	1,070,100	17.9	246,500	4.1	354,100	5.9

[1] Based on unpublished BAE data and data from enumerative survey by BAE, April 1948.

The regional variation in the number of farms using fertilizer was from 13 percent in the Northern Plains to 89 percent in the Southeast. In the Corn Belt and Lake States more than half of the farms used fertilizer and nearly one-third of them applied lime on cropland.

Emphasis has been given in recent years to the importance of improving permanent pastures. But the proportion of farms using fertilizer and lime on pasture remains small. Many farmers may withold applications because pasture is not a direct cash crop. Also in many areas pasturage of natural growth is adequate for the livestock on the farm during the spring and fall. Application of fertilizer would increase carrying capacity mostly at a time when it is not needed. Development of improved grasses and legumes for permanent summer pastures and the use of other practices such as rotation grazing would make for profitable use of more fertilizer and lime on pastures. It is estimated that all pasture and grazing land now furnishes about one-third of all of the digestible nutrients consumed by livestock. 5/ Probably about one-fourth of this is from plowable permanent pasture. As farmers learn to make more economical use of their pastures, marked expansion can be expected in the use of fertilizers on pasture land.

The percentage of farms making applications on pasture is based on the estimated total number of farms in the respective regions, including those in which much of the permanent pasture is arid grazing land, or woodland on which grazing occurs. If farms were excluded on which all permanent pasture is of these types the percentages pertaining to pasture in table 1 would be somewhat higher.

Land in Crops and Pasture Receiving Applications

A little more than 25 percent of all land in crops and about 5.3 percent of the pasture received applications of fertilizer in 1947. About 3.6 percent of the cropland and only 3.4 percent of the pasture received lime. The distribution based on acreages treated by regions (table 2) generally is similar to that based on the proportion of farms receiving applications. There are some exceptions. Seventy-one percent of the farms in the Delta region used fertilizer, but only 55.5 percent of the cropland was fertilized. The situation in the Appalachian region is similar. Aside from these two instances the regions stand in the same order in table 2 as in table 1.

Pasture acreages referred to in table 2 include plowable, nonwooded, permanent pasture, but exclude dry-range grazing areas in the Plains, Mountain, and Pacific regions. All dry-range grazing land is excluded from the total acreage figures used in estimating the percentage of pasture land receiving applications. The higher percentages of pasture that had applications in the Delta, the Southeast, and the Appalachian

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5/ Consumption of Feed by Livestock, U.S.D.A. Cir. 836, Dec. 1949.

Table 2.- Estimated acreage and percentage of land in crops and in pasture fertilized and limed, by regions, 1947

Region	Acreage of crops				Acreage of pasture 1/			
	Fertilized		Limed		Fertilized		Limed	
	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
Northeast	8,240,000	40.9	2,299,000	11.4	451,000	7.2	456,000	7.3
Corn Belt and Lake States	36,581,000	31.6	8,057,000	7.0	728,000	5.2	786,000	5.6
Appalachian	13,890,000	56.6	1,551,000	6.3	1,387,000	12.0	926,000	8.0
Southeast	18,864,000	84.2	368,000	1.6	516,000	13.9	301,000	8.1
Delta	9,408,000	55.4	179,000	1.1	614,000	14.0	280,000	6.4
Southern Plains	4,327,000	9.4	120,000	0.3	434,000	3.2	132,000	1.0
Northern Plains	2,735,000	3.2	623,000	0.7	74,000	0.5	13,000	0.1
Mountain	1,684,000	6.3	51,000	0.2	29,000	0.4	1,000	2/
Pacific	3,509,000	20.2	334,000	1.9	304,000	3.0	46,000	0.4
United States	99,238,000	26.5	13,582,000	3.6	4,537,000	5.3	2,941,000	3.4

1/ Based on plowable permanent pasture in humid regions and irrigated pasture. Arid range land and woodland pasture not included.

2/ Less than 0.05 percent.

regions, may be a result of recent changes in farming involving additional livestock. Recognition of the feed-production potential when improved pasture-management practices are adopted may be more general in these regions, particularly on farms where livestock enterprises have been added.

Quantities and Rates of Application Per Acre on Land in Crops and Pasture

The use of fertilizer by farmers in 1947 was more than double the 1935-39 average. For lime, the increase was nearly fivefold. Ninety-five percent of the fertilizer and 16 percent of the lime was used on cropland (table 3). Farmers in all regions used 90 percent or more of their fertilizer on cropland, but two-fifths or more of the lime was applied on pasture in the Appalachians, the Southeast, the Delta, and the Southern Plains. But in these four regions combined the tonnage of lime used accounted for only about 19 percent of the national total. Two-thirds of this 19 percent was used in the Appalachian region.

Average rates of fertilizer applied per acre on cropland exceeded 400 pounds in the Northeast, Appalachian, Southeast, and Pacific regions. Except for the Pacific Coast States, these regions also ranked highest in average rates per acre of fertilizer applied on pasture (table 4).

Two tons or more of lime were applied per acre on cropland in the Corn Belt and Lake States, the Southern Plains and the Northern Plains. Except for the Northeast, Appalachian, Southeastern, and Mountain States, lower rates of lime were applied per acre on pasture than on cropland. (Data in the survey indicated that lime was applied on pasture on some farms in the Mountain region but no data were given as to the quantities used. Therefore estimates as to acreage of pasture limed and quantities used there are based on experience indicated in the Pacific region).

Table 4.- Estimated rates per acre of fertilizer and of lime applied on crops and on pasture in the United States, by regions, 1947

Region and U.S.	Quantities applied per acre treated			
	On crops		On pasture	
	Fertilizer	Lime	Fertilizer	Lime
	Pounds	Tons	Pounds	Tons
Northeast	499	1.27	396	1.28
Corn Belt and Lake States	212	2.34	248	2.23
Appalachian	435	1.49	462	1.85
Southeast	401	1.54	470	1.74
Delta	220	1.91	362	1.25
Southern Plains	206	2.25	170	1.51
Northern Plains	102	2.00	46	0.90
Mountain	219	0.36	255	1.22
Pacific	441	1.81	228	1.22
United States	309	1.99	357	1.73

Table 3.- Estimated quantities and percentages of all fertilizer and of lime applied on crops and on pasture, by regions, 1947 1/

Region	Materials used on crops				Materials used on pasture			
	Fertilizer		Lime		Fertilizer		Lime	
	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent
Northeast	2,057,600	95.8	2,924,700	83.4	89,300	4.2	582,200	16.6
Corn Belt and Lake States	3,877,500	97.7	18,382,200	91.5	90,300	2.3	1,754,100	8.5
Appalachian	3,019,500	90.4	2,310,300	57.4	320,300	9.6	1,714,600	42.6
Southeast	3,779,300	96.9	566,900	52.0	121,300	3.1	523,300	48.0
Delta	1,036,000	90.3	341,300	49.0	111,100	9.7	349,400	51.0
Southern Plains	446,600	92.4	70,000	57.6	36,900	7.6	198,700	42.4
Northern Plains	139,900	98.8	1,246,700	99.1	1,700	1.2	11,300	0.9
Mountain	184,200	98.0	18,300	91.8	3,700	2.0	1,600	8.2
Pacific	773,300	95.7	604,300	91.5	34,600	4.3	56,100	8.5
United States	15,313,900	95.0	27,164,700	84.0	809,200	5.0	5,191,300	16.0

1/ Farm use only. Non-farm use of fertilizer is shown in table 5. Percentages were calculated from estimates of tonnages before rounding.

USE OF FERTILIZER ON INDIVIDUAL CROPS BY REGIONS

Estimates were developed of the amount of fertilizer used on individual crops, by regions. Applications of lime are considered only in terms of the general cropping system. Therefore cropland and pasture were the only use classifications considered in the survey with reference to lime.

Quantities of Fertilizer Applied

Corn, all vegetables, cotton, wheat, tobacco, oats and barley, hay, potatoes and sweetpotatoes, pasture, and fruits and nuts in the order named, were the principal crops receiving fertilizer in 1947 (table 5). These crops (including pasture), accounted for about 94 percent of all fertilizer used on farms. A little less than 2 percent of all fertilizer was accounted for by nonfarm use.

The relative importance of different crops as users of fertilizer is shown by regions in table 6. Nearly 2 1/2 times as much fertilizer was used on corn as on all vegetables, its nearest competitor. Farm gardens were included among the many vegetable crops receiving fertilizer. More fertilizer was used on corn than on any other single crop in the Corn Belt and Lake States, the Appalachian and the Southeastern States. Potatoes, vegetables, and corn, accounted for nearly three-fifths of all fertilizer used in the Northeast. In the Corn Belt and Lake States, wheat accounted for about half as much fertilizer as was used on corn. Oats and barley received nearly as much as was used on wheat.

Corn received about 4.5 percent more fertilizer than tobacco in the Appalachian region. Even in the Southeast, corn received between 5 and 6 percent more fertilizer than cotton. There vegetables received more than half as much as was used on cotton. Corn and cotton received about equal quantities of fertilizer in the Southern Plains, but vegetables received substantially more than was used on corn and cotton combined. Cotton received nearly twice as much fertilizer as corn in the Delta States. Nearly three-fourths of all fertilizer in the Northern Plains was used on wheat and corn. Use in the Mountain States centers largely around sugar beets, hay, vegetables, and potatoes. About 68 percent of the fertilizer used on farms in the Pacific region was applied on vegetables and fruits and nuts. Here a substantial percentage of all fertilizer was accounted for by nonfarm use.

Table 7 shows the estimated distribution of fertilizer used on each crop, by regions. For example, the Corn Belt and Lake States accounted for more than one-third of all fertilizer used on corn. But the Southeast and the Appalachian States, which had about 19 percent of the acreage of corn (table 8), accounted for nearly half the fertilizer used on that crop. The distribution by regions of the fertilizer used on cotton, tobacco, and peanuts, naturally follows the distribution of the acreage of these crops. Because of the response in terms of both yield and quality, tobacco receives liberal applications of fertilizer in most of its growing areas.

Table 5.- Estimated tonnage of fertilizer used on crops, pasture and off farms, by regions, 1947

Crop	Northeast	Corn Belt and Lake	Appalachian	Southeast	Delta	Southern Plains	Northern Plains	Mountain	Pacific	United States
	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons
Corn	375,500	1,451,800	996,700	1,106,000	226,800	59,100	37,800	5,100	2,600	4,261,400
Cotton 1/	--	18,600	242,300	878,300	416,200	57,300	--	6,100	16,500	1,635,300
Tobacco	82,200	10,600	345,800	189,700	--	--	--	--	--	1,128,300
Wheat	210,100	804,100	185,300	49,400	--	42,500	71,600	4,300	10,000	1,377,300
Other close growing cash crops	26,300	4,900	6,700	4,300	26,900	4,600	700	400	10,400	85,200
Oats and barley	122,900	705,600	60,000	149,900	47,900	7,100	13,100	5,600	14,300	1,126,400
Sugar crops	--	18,000	--	5,500	26,500	--	4,500	51,300	35,800	142,100
Peanuts	--	--	17,700	290,200	5,100	46,200	--	--	--	359,200
Other large seeded legumes	38,100	199,600	56,300	33,800	14,600	1,200	--	10,900	6,800	361,300
Potatoes and sweetpotatoes	529,400	113,600	189,800	85,700	94,300	23,400	500	19,900	54,400	1,111,000
Hay	176,200	262,600	277,500	169,800	79,100	30,700	10,100	46,500	64,100	1,116,600
All vegetables	399,900	234,000	97,700	472,700	70,300	147,800	300	25,200	300,300	1,748,200
Fruit and nuts	89,900	35,200	29,500	318,400	26,300	17,500	100	7,400	250,200	774,500
Other crops	7,100	18,900	14,200	25,600	2,000	9,200	1,200	1,000	7,900	87,100
All crops	2,057,600	3,877,500	3,019,500	3,779,300	1,036,000	446,600	139,900	184,200	773,300	15,313,900
Pasture	89,300	90,300	320,300	121,300	111,100	36,900	1,700	3,700	34,600	809,200
Farm use	2,146,900	3,967,800	3,339,800	3,900,600	1,147,100	483,500	141,600	187,900	807,900	16,123,100
Non-farm 2/	58,100	82,200	7,200	21,400	6,900	7,500	5,400	6,100	125,100	319,900
Total 3/	2,205,000	4,050,000	3,347,000	3,922,000	1,154,000	491,000	147,000	194,000	933,000	16,443,000

1/ Taken from Cotton Production, Bureau of Agricultural Economics, August 1950. (Processed.)

2/ Based primarily on estimates of non-farm use from BPISAE.

3/ Preliminary estimates from BPISAE.

Table 6.- Estimated percentage distribution of fertilizer among crops, pasture and non-farm use, by regions, 1947 1/

Crop	Northeast	Corn Belt and Lake	Appalachian	Southeast	Delta	Southern Plains	Northern Plains	Mountain	Pacific	United States
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Corn	17.0	35.9	29.8	28.2	19.7	12.0	25.7	2.6	0.3	25.9
Cotton	--	0.5	7.2	22.4	36.1	11.7	--	3.2	1.8	9.9
Tobacco	3.7	0.3	25.3	4.8	--	--	--	--	--	6.9
Wheat	9.5	19.8	5.5	1.3	--	8.6	48.7	2.2	1.1	8.4
Other close growing cash crops	1.2	0.1	0.2	0.1	2.3	1.0	0.4	0.2	1.1	0.5
Oats and barley	5.6	17.4	1.8	3.8	4.1	1.4	8.9	2.9	1.5	6.8
Sugar crops	--	0.4	--	0.1	2.3	--	3.1	26.7	3.8	0.9
Peanuts	--	--	0.5	7.4	0.4	9.4	--	--	--	2.2
Other large seeded legumes	1.7	4.9	1.7	0.9	1.3	0.2	--	5.6	0.7	2.2
Potatoes and sweetpotatoes	24.0	2.8	5.7	2.2	8.2	4.8	0.4	10.2	5.8	6.8
Hay	8.0	6.5	8.3	4.3	6.8	6.3	6.9	24.0	6.9	6.8
All vegetables	18.2	5.8	2.9	12.1	6.1	30.1	0.2	13.0	32.2	10.6
Fruit and nuts	4.1	0.9	0.9	8.1	2.3	3.6	0.1	3.8	26.8	4.7
Other crops	0.3	0.5	0.4	0.7	0.2	1.9	0.8	0.5	0.9	0.5
All crops	93.3	95.8	90.2	96.4	89.8	91.0	95.2	94.9	82.9	93.1
Pasture	4.1	2.2	9.6	3.1	9.6	7.5	1.2	1.9	3.7	4.9
Non-farm use	2.6	2.0	0.2	0.5	0.6	1.5	3.6	3.2	13.4	2.0
All fertilizer	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

1/ Percentages calculated from estimates of tonnages before rounding.

Table 7.- Estimated percentage distribution of fertilizer among regions, by crops, pasture and non-farm use, 1947 1/

Crop	Northeast	Corn Belt and Lake	Appalachian	Southeast	Delta	Southern Plains	Northern Plains	Mountain	Pacific	United States
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Corn	8.8	34.1	23.4	25.9	5.3	1.4	0.9	0.1	0.1	100.0
Cotton	--	1.1	14.8	53.7	25.5	3.5	--	0.4	1.0	100.0
Tobacco	7.3	0.9	75.0	16.8	--	--	--	--	--	100.0
Wheat	15.2	58.4	13.5	3.6	--	3.1	5.2	0.3	0.7	100.0
Other close growing cash crops	30.8	5.7	7.9	5.1	31.5	5.5	0.8	0.4	12.3	100.0
Oats and barley	10.9	62.6	5.3	13.3	4.3	0.6	1.2	0.5	1.3	100.0
Sugar crops	--	12.7	--	3.9	18.6	--	3.2	36.4	25.2	100.0
Peanuts	--	--	4.9	80.8	1.4	12.9	--	--	--	100.0
Other large seeded legumes	10.6	55.2	15.6	9.4	4.0	0.3	--	3.0	1.9	100.0
Potatoes and sweetpotatoes	47.6	10.2	17.1	7.7	8.5	2.1	0.1	1.8	4.9	100.0
Hay	15.8	23.5	24.8	15.2	7.1	2.8	0.9	4.2	5.7	100.0
All vegetables	22.9	13.4	5.6	27.0	4.0	8.5	2/ 0.0	1.4	17.2	100.0
Fruit and nuts	11.6	4.5	3.8	41.1	3.4	2.3	2/ 0.0	1.0	32.3	100.0
Other crops	8.1	21.7	16.3	29.4	2.3	10.6	1.4	1.2	9.0	100.0
All crops	13.4	25.3	19.7	24.7	6.8	2.9	0.9	1.2	5.1	100.0
Pasture	11.0	11.2	39.6	15.0	13.7	4.5	0.2	0.5	4.3	100.0
Non-farm use	18.2	25.7	2.2	6.7	2.2	2.3	1.7	1.9	39.1	100.0
All fertilizer	13.4	24.6	20.4	23.8	7.0	3.0	0.9	1.2	5.7	100.0

1/ Percentages calculated from estimates of tonnages before rounding.
2/ Less than 0.05 percent.

Table 8.- Acres of land in crops and in pasture, by regions, 1947 1/

Crop	North-east	Corn Belt and Lake	Appa-lachian	South-east	Delta	Southern Plains	Northern Plains	Mountain	Pacific	United States
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres
Corn 2/	2,946	41,365	8,031	8,132	4,698	4,292	15,418	1,121	105	86,108
Cotton 3/	---	481	1,404	3,874	5,322	9,583	---	377	570	21,611
Tobacco 4/	115	58	1,407	272	---	---	---	---	---	1,852
Wheat 2/	1,913	9,465	1,902	541	63	14,705	34,158	10,642	4,780	78,169
Other close growing cash crops 2/	551	2,653	548	76	979	757	3,539	412	617	10,132
Oats and barley 2/	1,930	22,655	1,508	2,260	1,160	3,541	14,292	3,462	3,595	54,403
Sugar crops 5/	---	178	---	90	341	2	122	460	208	1,401
Peanuts 4/	---	---	459	1,718	28	1,161	---	14	---	3,380
Other large seeded legumes 6/	247	10,361	528	324	523	210	416	1,010	635	14,254
Potatoes and sweet-potatoes 4/	586	459	345	301	236	119	217	253	180	2,696
Hay 4/	10,158	24,921	7,149	2,841	2,503	3,196	13,269	7,479	3,973	75,489
All vegetables 7/	905	2,063	575	987	696	966	166	297	792	7,447
Fruit and nuts 8/	710	713	522	796	252	277	27	114	1,776	5,187
Other crops 9/	88	340	166	200	170	7,109	2,757	940	142	11,912
All crops	20,149	115,712	24,544	22,412	16,971	45,918	84,381	26,581	17,373	374,041
Pasture 10/	6,228	14,131	11,559	3,722	4,379	13,652	14,559	7,322	10,157	85,709

[1] Data from Agricultural Statistics, 1949, except where otherwise noted. [2] Planted acres.

[3] From Cotton Production, Bureau of Agricultural Economics, Aug. 1950, (Processed.)

[4] Harvested acres.

[5] Planted acres of sugar beets; harvested acres of sugar cane for sugar, seed, and sirup.

[6] Soybeans for beans and cowpeas for peas, 11,799,000 acres harvested; dry field peas, dry edible beans, and mungbeans, 2,455,000 acres planted.

[7] Harvested acres. Includes an estimate of 3,800,000 acres of farm gardens developed primarily from value figures reported in 1945 Census of Agriculture.

[8] Acreage of fruits, nuts, and small fruits taken from 1945 Census of Agriculture.

[9] Harvested acres of mint, popcorn, broomcorn, hops, and sorghums for grain, forage, silage, and sirup. Total acreage also includes an estimated acreage of nurseries, horticultural specialties, bulbs, flowers, etc.

[10] BAE estimate of plowable permanent pasture - woodland pasture and range in arid regions excluded.

Wheat was the principal crop to receive fertilizer in the Northern Plains but more than half of the fertilizer used on wheat was applied in the Corn Belt and Lake States. There, as in the Northeast and Appalachian regions, much of the fertilizer on the wheat fields benefits succeeding crops in the rotation. The use of fertilizer on wheat in the Plains is confined mostly to the eastern higher rainfall areas.

Extent of Applications

Total acreages of crops by regions are given in table 8 as the basis for estimating the percentages of acreages fertilized. Certain crops were grouped for purposes of estimating the distribution of fertilizer. 6/ The estimated acreages receiving applications of fertilizer are shown in table 9. From tables 8 and 9 are then computed the percentages of the acreages fertilized by regions (table 10) and the percentage distribution of fertilized acres among regions, by crops (table 11).

Three-fourths of the acreage of potatoes and of the vegetables and nearly all of the tobacco received applications. About three-fifths of the acreage of fruits and nuts and more than two-fifths of the corn and of the cotton were fertilized (table 10).

A relatively high percentage of nearly all crops received applications in the Southeast, where a total of about 84 percent of all land in crops was fertilized. Approximately equal percentages (about 55 percent) of the land in crops were given fertilizer in the Appalachian and Delta regions, but a much higher percentage of the corn in the Appalachian States. In the Northeast, where two-fifths of the land in crops was fertilized, about 96 percent of the potatoes, more than 90 percent of the vegetables, and more than 80 percent of the corn had applications. High percentages of the vegetables, fruits and nuts, and sugar beets, were fertilized in the Mountain and Pacific regions.

6/ Crops included in each of the following groups are:

"Other close-growing cash crops" - rye, rice, buckwheat and flax.

"Other large seeded legumes" - soybean for beans, cowpeas, dry field peas, dry edible beans and mungbeans.

"All vegetables" - 21 truck crops (11 processing and 19 for fresh market), and an estimate of the acreage of farm gardens based on value data reported in the 1945 census.

"Other crops" - sorghums for grain, forage, sirup and silage, mint, popcorn, broomcorn, hemp, hops, and an estimate of the acreage in nurseries, horticultural specialties, bulbs, flowers, etc.

Table 9.- Estimated acres of land in crops and pasture fertilized, 1947 1/

Crop	North-east	Corn Belt and Lake	Appa-lachian	South-east	Delta	Southern Plains	Northern Plains	Mountain	Pacific	United States
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres
Corn	2,454	17,284	6,600	7,473	2,638	777	610	73	27	37,936
Cotton	---	207	1,172	3,835	3,619	622	---	51	138	9,644
Tobacco	114	49	1,379	272	---	---	---	---	---	1,814
Wheat	1,439	7,446	1,495	470	2/	885	1,590	68	312	13,705
Other close growing cash crops	181	88	48	63	625	108	16	3	92	1,224
Oats and barley	885	5,976	484	1,755	591	100	291	119	143	10,344
Sugar crops	---	91	---	36	285	---	45	345	179	981
Peanuts	---	---	177	1,541	25	632	---	---	---	2,375
Other large seeded legumes	185	2,123	343	225	125	12	---	95	34	3,142
Potatoes and sweetpotatoes	568	343	257	270	201	82	7	143	162	2,033
Hay	1,115	1,313	1,206	1,011	569	320	154	500	425	6,613
All vegetables	825	1,238	499	975	517	566	3	223	780	5,626
Fruit and nuts	441	215	152	788	168	99	1	51	1,185	3,100
Other crops	33	208	78	150	45	124	18	13	32	701
All crops	8,240	36,581	13,890	18,864	9,408	4,327	2,735	1,684	3,509	99,238
Pasture	451	728	1,387	516	614	434	74	29	304	4,537

1/ Does not include acreage receiving gypsum and sulfur.

2/ Survey showed no wheat fertilized in this area, therefore no separate estimate was made.

Table 10.- Estimated percentage of the acreage of crops and of pasture fertilized, by regions, 1947

Crop	North-east	Corn Belt and Lake	Appa-lachian	South-east	Delta	Southern Plains	Northern Plains	Mountain	Pacific	United States
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Corn	83.3	41.8	82.2	91.9	56.2	19.2	4.0	6.5	25.7	44.1
Cotton	---	43.0	83.5	99.0	68.0	6.5	---	13.5	24.2	44.6
Tobacco	99.1	84.5	98.0	100.0	---	---	---	---	---	97.9
Wheat	75.2	78.7	78.6	86.9	---	6.0	4.7	0.6	6.5	17.5
Other close growing cash crops	32.8	3.3	8.8	82.9	63.8	14.3	0.5	0.7	14.9	12.1
Oats and barley	45.9	26.4	32.1	77.7	50.9	2.8	2.0	3.4	4.0	19.0
Sugar crops	---	51.1	---	40.0	83.6	---	36.9	75.0	86.1	70.0
Peanuts	---	---	38.6	89.7	89.5	54.4	---	---	---	70.3
Other large seeded legumes	74.9	20.5	65.0	69.4	23.9	5.7	---	9.4	5.4	22.0
Potatoes and sweetpotatoes	96.9	74.7	74.5	89.7	85.2	68.9	3.2	56.5	90.0	75.4
Hay	11.0	5.3	16.9	35.6	22.7	10.0	1.2	6.7	10.7	8.8
All vegetables	91.2	60.0	86.8	98.8	74.3	58.6	1.8	75.1	98.5	75.5
Fruit and nuts	62.1	30.2	29.1	99.0	66.7	35.7	3.7	44.7	66.7	59.8
Other crops	37.5	61.2	47.0	75.0	26.5	1.7	0.7	1.4	22.5	5.9
All crops	40.9	31.6	56.6	84.2	55.4	9.4	3.2	6.3	20.2	26.5
Pasture	7.2	5.2	12.0	13.9	14.0	3.2	0.5	0.4	3.0	5.3

Table 11.- Estimated percentage distribution of fertilized acres among regions by crops, 1947

Crop	North-east	Corn Belt and Lake	Appa-lachian	South-east	Delta	Southern Plains	Northern Plains	Mountain	Pacific	United States
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Corn	6.5	45.6	17.4	19.7	6.9	2.0	1.6	0.2	0.1	100.0
Cotton	---	2.2	12.2	39.8	37.5	6.4	---	0.5	1.4	100.0
Tobacco	6.3	2.7	76.0	15.0	---	---	---	---	---	100.0
Wheat	10.5	54.3	10.9	3.4	---	6.5	11.6	0.5	2.3	100.0
Other close growing cash crops	14.8	7.2	3.9	5.2	51.1	8.8	1.3	0.2	7.5	100.0
Oats and barley	8.5	57.8	4.7	17.0	5.7	1.0	2.8	1.1	1.4	100.0
Sugar crops	---	9.3	---	3.7	29.0	---	4.6	35.2	18.2	100.0
Peanuts	---	---	7.5	64.9	1.0	26.6	---	---	---	100.0
Other large seeded legumes	5.9	67.6	10.9	7.1	4.0	0.4	---	3.0	1.1	100.0
Potatoes and sweetpotatoes	28.0	16.9	12.6	13.3	9.9	4.0	0.3	7.0	8.0	100.0
Hay	16.9	19.9	13.2	15.3	8.6	4.8	2.3	7.6	6.4	100.0
All vegetables	14.6	22.0	8.9	17.3	9.2	10.1	0.1	4.0	13.8	100.0
Fruit and nuts	14.2	7.0	4.9	25.4	5.4	3.2	1/	1.7	38.2	100.0
Other crops	4.7	29.7	11.1	21.4	6.4	17.7	2.6	1.8	4.6	100.0
All crops	8.3	36.9	14.0	19.0	9.5	4.4	2.7	1.7	3.5	100.0
Pasture	9.9	16.1	30.6	11.4	13.5	9.6	1.6	0.6	6.7	100.0

1/ Less than 0.05 percent

More than one-third of the fertilized acreage of land in crops and one-sixth of the fertilized pasture was estimated to be in the Corn Belt and Lake States. Nearly half of the fertilized acreage of corn, more than half of the wheat, nearly three-fifths of the oats and barley, and about one-fifth of the vegetables fertilized were estimated to be in that region. About one-fifth of the fertilized acreage of land in crops was in the Southeast, 14 percent in the Appalachian, and 8.3 percent in the Northeast. These and other details regarding the percentage distribution of fertilized acres among regions by crops, are shown in table 11.

Rates of Application Per Acre

Highest U. S. average rates per acre were applied on tobacco, potatoes and sweetpotatoes, vegetables, fruits and nuts, pasture, cotton and hay, in the order named. The order of different crops with respect to rates of application per acre varies among regions. Potatoes received higher rates per acre than any other crop in the Northeast, Corn Belt and Lake States, Appalachian, Delta, Southern Plains, Mountain, and Pacific regions. Corn, which received far more in total than any other crop had its highest rates of application per acre in the Northeast, Appalachian, and Southeast regions. An average of 168 pounds of fertilizer was applied on corn in the Corn Belt and Lake States (table 12). These rates are for pounds of material used on the acreages receiving applications. Quantities and rates per acre of plant nutrients applied on different crops, by regions, are given in the following section.

PLANT NUTRIENTS IN FERTILIZERS BY REGIONS AND CROPS

Tables 5, 6, and 7 present respectively by regions and crops: (1) the estimated quantity of fertilizer materials applied, (2) the percentage distribution of these materials among crops, by regions, and (3) their percentage distribution among regions, by crops. The counterparts of these tables in terms of plant nutrients (Nitrogen (N); Phosphoric acid (P_2O_5); and Potash (K_2O), are shown in tables 13, 14, and 15. These tables are self-explanatory.

The estimated average rates of application of fertilizer materials by regions and crops is shown in table 12. Rates of materials do not reflect adequately the application of effective plant nutrients because of the differences in grades used. Therefore estimates of the quantities of plant nutrients applied on the different crops by regions are given in tables 16 and 17. Table 16 shows the estimated rates per acre of the three principal nutrients separately. Table 17 gives these estimates by regions and crops in terms of the combined quantities of N, P_2O_5 and K_2O.

Highest U. S. average rates per acre of plant nutrients were applied on potatoes, tobacco, vegetables, fruits and nuts, pasture, sugar crops, and cotton, in the order named. Tobacco received a higher rate of fertilizer material per acre than did potatoes (table 12) but the materials used on the latter crop carry a higher analysis.

Table 12.- Estimated average rates of application of fertilizer on crops and on pasture, by regions, 1947

Crop	North-east	Corn Belt and Lake	Appa-lachian	South-east	Delta	Southern Plains	Northern Plains	Mountain	Pacific	United States
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Corn	306	168	302	296	172	152	124	139	193	225
Cotton	---	180	413	458	230	184	---	240	239	339
Tobacco	1,443	432	1,227	1,395	---	---	---	---	---	1,244
Wheat	292	216	248	210	---	96	90	126	64	201
Other close growing cash crops	290	110	279	137	86	86	84	250	227	139
Oats and barley	278	236	248	171	162	142	90	94	199	218
Sugar crops	---	396	---	306	186	---	201	300	400	290
Peanuts	---	---	200	377	408	146	---	---	---	302
Other large seeded legumes	413	188	328	300	234	194	---	229	401	230
Potatoes and sweetpotatoes	1,864	662	1,477	635	938	573	155	278	672	1,091
Hay	352	400	460	336	278	192	132	186	302	338
All vegetables	969	378	392	970	272	522	186	226	770	621
Fruit and nuts	408	328	388	808	314	353	206	291	422	500
Other crops	429	182	365	342	89	149	133	161	489	249
All crops	499	212	435	401	220	206	102	219	441	309
Pasture	396	248	462	470	362	170	46	255	228	357

Table 13.- Estimated tonnage of plant nutrients used on crops, pasture and off farms by regions, 1947

Crop	NORTHEAST			CORN BELT AND LAKE			APPALACHIAN			SOUTHEAST			DELTA		
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons
Corn	11,900	49,300	21,800	26,400	170,300	97,900	49,400	100,500	52,200	68,100	91,100	55,000	24,300	15,600	7,600
Cotton	-	-	-	300	1,400	2,100	14,600	20,400	13,700	47,000	76,800	46,200	56,600	25,200	16,500
Tobacco	3,900	6,300	5,100	300	1,100	900	34,900	72,400	49,600	5,800	16,700	13,400	-	-	-
Wheat	6,300	27,000	12,800	13,000	92,300	46,900	6,500	21,700	10,000	3,400	3,800	2,500	-	-	-
Other close growing cash crops	600	3,900	1,200	100	600	200	300	800	400	400	200	200	3,800	1,400	300
Oats and barley	3,100	17,700	5,900	34,700	76,000	40,300	3,100	6,000	4,800	6,000	16,000	7,800	2,600	4,900	2,300
Sugar crops	-	-	-	200	2,300	1,200	-	-	-	200	500	400	5,900	500	800
Peanuts	-	-	-	-	-	-	200	1,800	900	11,400	28,300	17,600	600	300	1/
Other large seeded legumes	1,400	4,600	2,200	2,600	23,400	12,400	1,700	6,400	3,800	1,000	2,900	1,500	300	1,200	200
Potatoes and sweetpotatoes	25,500	57,500	54,900	2,100	13,700	9,800	11,600	16,400	9,200	3,300	8,800	5,000	5,300	9,200	4,600
Hay	3,200	31,200	9,700	1,600	26,900	5,600	1,800	45,500	9,400	1,300	15,900	5,900	1,600	11,200	200
All vegetables	18,900	43,100	26,100	5,900	30,100	17,700	6,500	8,400	6,100	31,000	36,200	22,600	5,000	6,800	2,600
Fruit and nuts	7,500	8,200	4,000	4,300	3,600	1,500	2,400	1,700	2,300	14,800	32,200	19,000	1,200	3,600	700
Other crops	200	1,000	300	200	3,000	1,000	600	1,500	700	800	1,500	6,300	200	200	100
All crops	82,500	249,800	144,000	91,700	444,700	237,500	133,600	303,500	163,100	194,500	330,900	203,400	107,400	80,100	35,900
Pasture	2,000	16,500	2,200	1,600	13,800	3,300	1,200	63,900	7,200	1,100	17,900	4,800	2,300	19,400	2,700
Farm use	84,500	266,300	146,200	93,300	458,500	240,800	134,800	367,400	170,300	195,600	348,800	208,200	109,700	99,500	38,600
Non-farm use	2,900	4,900	1,800	5,100	5,500	2,300	800	1,300	500	1,400	1,500	900	800	500	100
Total	87,400	271,200	148,000	98,400	464,000	243,100	135,600	368,700	170,800	197,000	350,300	209,100	110,500	100,000	38,700

Crop	SOUTHERN PLAINS			NORTHERN PLAINS			MOUNTAIN			PACIFIC			UNITED STATES		
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons
Corn	3,000	6,600	1,700	6,800	1,800	200	100	900	-	600	300	100	190,600	436,400	236,500
Cotton	1,900	6,900	1,800	-	-	-	600	600	1/	1,200	2,500	100	122,200	133,800	80,400
Tobacco	-	-	-	-	-	-	-	-	-	-	-	-	44,900	96,500	69,000
Wheat	2,200	9,500	200	600	14,600	900	100	900	100	3,300	500	-	35,400	170,300	73,400
Other close growing cash crops	100	800	1/	1/	100	1/	200	100	1/	3,100	700	1/	8,600	8,600	2,300
Oats and barley	200	900	200	-	2,500	800	1,600	800	-	4,700	1,500	-	56,000	126.300	62,100
Sugar crops	-	-	-	100	1,700	-	2,700	8,400	600	6,400	2,400	700	15,500	15,800	3,700
Peanuts	1,300	6,300	1,200	-	-	-	-	-	-	-	-	-	13,500	36,700	19,700
Other large seeded legumes	1/	200	1/	-	-	-	100	2,800	1/	800	500	100	7,900	42,000	20,200
Potatoes and sweetpotatoes	1,800	1,100	1,100	1/	100	1/	1,700	4,100	100	9,400	4,300	400	60,700	115,200	85,100
Hay	100	7,000	100	200	2,500	200	600	10,200	400	1,700	10,400	1,100	12,100	160,800	32,600
All vegetables	7,000	17,000	4,100	1/	1/	100	4,600	2,900	400	34,700	26,200	9,500	113,600	170,700	89,200
Fruit and nuts	3,300	300	200	-	1/	-	2,000	700	1/	49,200	15,400	4,900	84,700	65,700	32,600
Other crops	300	1,400	200	-	200	200	200	200	1/	300	1,100	100	2,800	10,100	8,900
All crops	21,200	58,000	10,800	7,700	23,500	2,400	14,500	32,600	1,600	115,400	65,800	17,000	768,500	1,588,900	815,700
Pasture	100	7,100	100	100	100	100	200	500	1/	400	6,000	700	9,000	145,200	21,100
Farm use	21,300	65,100	10,900	7,800	23,600	2,500	14,700	33,100	1,600	115,800	71,800	17,700	777,500	1,734,100	836,800
Non-farm use	500	700	200	400	400	200	600	500	500	4,800	6,200	3,200	17,300	21,500	9,700
Total	21,800	65,800	11,100	8,200	24,000	2,700	15,300	33,600	2,100	120,600	78,000	20,900	794,800	1,755,600	846,500

1/ Less than 50 tons.

Table 14.- Estimated percentage distribution of plant nutrients among crops, pasture and non-farm use, by regions, 1947 1/

Crop	NORTHEAST			CORN BELT AND LAKE			APPALACHIAN			SOUTHEAST			DELTA		
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Corn	13.6	18.2	14.7	26.8	36.7	40.3	36.4	27.3	30.5	34.6	26.0	26.3	22.0	15.6	19.7
Cotton	-	-	-	0.3	0.3	0.8	10.8	5.5	8.0	23.8	21.9	22.1	51.3	25.2	42.7
Tobacco	4.4	2.3	3.4	0.3	0.2	0.4	25.8	19.6	29.1	3.0	4.8	6.4	-	-	-
Wheat	7.2	10.0	8.7	13.2	19.9	19.3	4.8	5.9	5.9	1.7	1.1	1.2	-	-	-
Other close growing cash crops	0.7	1.4	0.9	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.1	3.4	1.4	0.8
Oats and barley	3.5	6.5	4.0	35.3	16.4	16.6	2.3	1.6	2.8	3.0	4.6	3.7	2.3	4.8	5.9
Sugar crops	-	-	-	0.3	0.5	0.5	-	-	-	0.1	0.1	0.2	5.3	0.5	1.9
Peanuts	-	-	-	-	-	-	0.1	0.5	0.5	5.8	8.1	8.4	0.6	0.4	0.1
Other large seeded legumes	1.6	1.7	1.5	2.6	5.0	5.1	1.2	1.7	2.3	0.5	0.9	0.7	0.2	1.2	0.6
Potatoes and sweetpotatoes	29.2	21.2	37.1	2.1	3.0	4.0	8.5	4.5	5.4	1.7	2.5	2.4	4.8	9.2	11.8
Hay	3.6	11.5	6.5	1.6	5.8	2.3	1.4	12.4	5.5	0.6	4.5	2.9	1.4	11.2	0.5
All vegetables	21.7	15.9	17.6	6.0	6.5	7.3	4.8	2.3	3.6	15.8	10.3	10.8	4.6	6.8	6.6
Fruit and nuts	8.6	3.0	2.7	4.4	0.8	0.6	1.7	0.5	1.3	7.5	9.2	9.1	1.1	3.6	1.9
Other crops	0.2	0.4	0.2	0.2	0.6	0.4	0.5	0.4	0.4	0.4	0.4	3.0	0.2	0.2	0.2
All crops	94.3	92.1	97.3	93.2	95.8	97.7	98.5	82.4	95.5	98.7	94.5	97.3	97.2	80.1	92.7
Pasture	2.3	6.1	1.5	1.6	3.0	1.4	0.9	17.3	4.2	0.6	5.1	2.3	2.1	19.4	6.9
Farm use	96.6	98.2	98.8	94.8	98.8	99.1	99.4	99.7	99.7	99.3	99.6	99.6	99.3	99.5	99.6
Non-farm use	3.4	1.8	1.2	5.2	1.2	0.9	0.6	0.3	0.3	0.7	0.4	0.4	0.7	0.5	0.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Crop	SOUTHERN PLAINS			NORTHERN PLAINS			MOUNTAIN			PACIFIC			UNITED STATES		
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Corn	13.9	10.0	15.0	82.8	7.6	7.6	1.0	2.8	-	0.5	0.4	0.5	24.0	24.9	27.9
Cotton	8.9	10.5	15.9	-	-	-	3.7	2.0	1.3	1.0	3.2	0.3	15.4	7.6	9.5
Tobacco	-	-	-	-	-	-	-	-	-	-	-	-	5.6	5.5	8.2
Wheat	10.0	14.4	1.6	6.8	60.6	36.0	0.9	2.7	2.4	2.7	0.6	-	4.4	9.7	8.7
Other close growing cash crops	0.5	1.2	0.4	0.2	0.4	0.8	0.9	0.2	0.1	2.5	0.9	0.2	1.1	0.5	0.3
Oats and barley	1.0	1.4	1.7	-	10.4	28.6	10.1	2.3	-	3.9	1.9	-	7.0	7.2	7.3
Sugar crops	-	-	-	0.8	7.2	-	17.9	25.1	29.2	5.3	3.0	3.4	2.0	0.9	0.4
Peanuts	6.0	9.5	10.8	-	-	-	-	-	-	-	-	-	1.7	2.1	2.3
Other large seeded legumes	0.1	0.3	0.1	-	-	-	0.9	8.3	2.0	0.7	0.7	0.5	1.0	2.4	2.4
Potatoes and sweetpotatoes	8.4	1.7	10.3	0.2	0.3	1.0	11.3	12.4	6.3	7.8	5.5	1.7	7.6	6.6	10.1
Hay	0.3	10.7	0.8	3.2	10.1	7.2	3.8	30.5	15.9	1.4	13.4	5.4	1.5	9.2	3.8
All vegetables	31.9	25.9	36.8	0.2	0.2	2.0	30.0	8.5	19.0	28.8	33.6	45.8	14.3	9.7	10.5
Fruit and nuts	15.2	0.4	1.7	-	0.1	-	13.2	1.9	1.4	40.8	19.7	23.4	10.7	3.7	3.8
Other crops	1.2	2.1	1.7	-	0.8	7.3	1.5	0.5	0.1	0.3	1.4	0.4	0.4	0.5	1.1
All crops	97.4	88.1	96.8	94.2	97.7	90.5	95.2	97.2	77.7	95.7	84.3	81.6	96.7	90.5	96.3
Pasture	0.4	10.8	1.3	1.2	0.5	2.6	1.2	1.5	0.8	0.3	7.6	3.1	1.1	8.3	2.5
Farm use	97.8	98.9	98.1	95.4	98.2	93.1	96.4	98.7	78.5	96.0	92.0	84.7	97.8	98.8	98.8
Non-farm use	2.2	1.1	1.9	4.6	1.8	6.9	3.6	1.3	21.5	4.0	8.0	15.3	2.2	1.2	1.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

1/ Percentages were calculated from estimates of tonnages before rounding.

Table 15.- Estimated percentage distribution of plant nutrients among regions, by crops, pasture and non-farm use, 1947 1/

Crop	NORTHEAST			CORN BELT AND LAKE			APPALACHIAN			SOUTHEAST			DELTA		
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Corn	6.2	11.3	9.2	13.8	39.0	41.4	25.9	23.0	22.0	35.7	20.9	23.3	12.8	3.6	3.2
Cotton	-	-	-	0.2	1.1	2.6	12.0	15.2	17.0	38.4	57.4	57.5	46.3	18.8	20.6
Tobacco	8.6	6.5	7.3	0.6	1.2	1.4	77.9	75.0	71.9	12.9	17.3	19.4	-	-	-
Wheat	17.9	15.8	17.5	36.8	54.2	63.8	18.2	12.7	13.7	9.6	2.3	3.4	-	-	-
Other close growing cash crops	7.2	45.3	52.8	0.8	7.0	8.2	3.9	9.4	15.2	4.8	2.8	6.2	44.5	15.8	13.3
Oats and barley	5.5	14.0	9.6	62.0	60.2	64.9	5.6	4.8	7.7	10.7	12.7	12.6	4.6	3.8	3.7
Sugar crops	-	-	-	1.8	14.2	34.5	-	-	-	1.1	2.9	10.1	37.9	3.4	20.1
Peanuts	-	-	-	-	-	-	1.1	5.0	4.6	84.6	77.0	89.1	4.5	1.0	0.2
Other large seeded legumes	18.1	10.8	10.8	32.4	55.8	61.1	21.4	15.2	19.0	12.2	7.0	7.2	3.3	2.9	1.1
Potatoes and sweetpotatoes	42.0	49.9	64.5	3.5	11.9	11.5	19.0	14.3	10.8	5.5	7.6	5.8	8.7	8.0	5.4
Hay	26.1	19.4	29.6	13.1	16.7	17.3	15.3	28.2	28.8	10.5	9.9	18.3	13.0	7.0	0.6
All vegetables	16.7	25.3	29.2	5.2	17.6	19.9	5.7	4.9	6.9	27.3	21.2	25.4	4.4	4.0	2.8
Fruit and nuts	8.9	12.5	12.4	5.1	5.5	4.5	2.8	2.6	6.9	17.4	49.0	58.3	1.4	5.5	2.2
Other crops	7.8	9.8	3.6	7.0	30.1	11.3	23.1	15.3	8.0	27.2	14.5	70.9	6.3	1.9	1.0
All crops	10.7	15.7	17.7	11.9	28.0	29.1	17.4	19.1	20.0	25.3	20.8	24.9	14.0	5.0	4.4
Pasture	22.1	11.4	10.4	17.8	9.5	15.6	13.3	44.0	34.1	13.0	12.3	23.0	25.6	13.4	12.7
Farm use	10.9	15.4	17.5	12.0	26.4	28.8	17.3	21.2	20.3	25.2	20.1	24.9	14.1	5.7	4.6
Non-farm use	17.0	22.7	18.8	29.6	25.7	23.6	4.6	5.9	5.6	8.2	6.9	9.2	4.8	2.2	1.4
Total	11.0	15.4	17.5	12.4	26.4	28.7	17.1	21.0	20.2	24.8	20.0	24.7	13.9	5.7	4.6

Crop	SOUTHERN PLAINS			NORTHERN PLAINS			MOUNTAIN			PACIFIC			UNITED STATES		
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Corn	1.6	1.5	0.7	3.6	0.4	0.1	0.1	0.2	-	0.3	0.1	0.1	100.0	100.0	100.0
Cotton	1.6	5.2	2.2	-	-	-	0.5	0.5	2/	1.0	1.8	0.1	100.0	100.0	100.0
Tobacco	-	-	-	-	-	-	-	-	-	-	-	-	100.0	100.0	100.0
Wheat	6.1	5.6	0.2	1.6	8.6	1.3	0.4	0.5	0.1	9.4	0.3	2/	100.0	100.0	100.0
Other close growing cash crops	1.4	9.4	2.0	0.2	1.2	0.9	1.6	0.6	2/	35.6	8.5	1.4	100.0	100.0	100.0
Oats and barley	0.4	0.7	0.3	-	2.0	1.2	2.7	0.6	-	8.5	1.2	-	100.0	100.0	100.0
Sugar crops	-	-	-	0.4	11.0	-	17.6	53.5	16.2	41.2	15.0	19.1	100.0	100.0	100.0
Peanuts	9.8	17.0	6.1	-	-	-	-	-	-	-	-	-	100.0	100.0	100.0
Other large seeded legumes	0.1	0.5	0.1	-	-	-	1.8	6.6	0.2	10.7	1.2	0.5	100.0	100.0	100.0
Potatoes and sweetpotatoes	3.0	0.9	1.4	2/	0.1	2/	2.9	3.6	0.2	15.4	3.7	0.4	100.0	100.0	100.0
Hay	0.5	4.4	0.3	2.2	1.5	0.6	4.7	6.4	1.0	14.6	6.5	3.5	100.0	100.0	100.0
All vegetables	6.1	10.0	4.6	2/	2/	0.1	4.0	1.7	0.4	30.6	15.3	10.7	100.0	100.0	100.0
Fruit and nuts	3.9	0.5	0.6	-	2/	-	2.4	1.0	0.1	58.1	23.4	15.0	100.0	100.0	100.0
Other crops	9.3	13.6	2.1	-	2.0	2.2	7.8	1.6	2/	11.5	11.2	0.9	100.0	100.0	100.0
All crops	2.8	3.6	1.3	1.0	1.5	0.3	1.9	2.1	0.2	15.0	4.2	2.1	100.0	100.0	100.0
Pasture	1.0	4.9	0.7	1.0	0.1	0.3	2.1	0.3	0.1	4.1	4.1	3.1	100.0	100.0	100.0
Farm use	2.7	3.8	1.3	1.0	1.4	0.3	1.9	1.9	0.2	14.9	4.1	2.1	100.0	100.0	100.0
Non-farm use	2.7	3.5	2.2	2.2	2.0	1.9	3.1	2.1	4.5	27.8	29.0	32.8	100.0	100.0	100.0
Total	2.7	3.8	1.3	1.0	1.4	0.3	1.9	1.9	0.2	15.2	4.4	2.5	100.0	100.0	100.0

1/ Percentages were calculated from estimates of tonnages before rounding.

2/ Less than 0.05 percent.

Table 16.- Estimated average rates of application per acre each of the three principal plant nutrients on crops and on pasture, by regions, 1947

Crop	NORTHEAST			CORN BELT AND LAKE			APPALACHIAN			SOUTHEAST			DELTA		
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Corn	10	40	18	3	20	11	15	30	16	18	24	15	18	12	6
Cotton	-	-	-	3	14	20	25	35	23	24	40	24	31	14	9
Tobacco	68	110	88	11	47	38	51	105	72	43	123	99	-	-	-
Wheat	9	37	18	4	25	13	9	29	13	14	16	11	-	-	-
Other close growing cash crops	7	43	14	1	14	4	14	34	15	13	8	5	12	4	1
Oats and barley	7	40	13	12	25	13	13	25	20	7	18	9	9	16	8
Sugar crops	-	-	-	6	49	28	-	-	-	10	25	21	41	4	5
Peanuts	-	-	-	-	-	-	2	21	10	15	37	23	49	28	3
Other large seeded legumes	15	49	24	2	22	12	10	37	22	9	26	13	4	19	4
Potatoes and sweetpotatoes	90	202	193	12	80	57	90	128	72	25	65	37	53	92	46
Hay	6	56	17	2	41	9	3	75	14	3	31	12	6	39	1
All vegetables	46	105	63	10	49	29	26	34	25	65	74	46	19	26	10
Fruit and nuts	34	37	18	40	33	14	31	23	30	37	82	48	14	43	9
Other crops	13	60	20	29	29	10	17	40	18	10	20	84	8	8	4
All crops	20	61	35	5	24	13	19	44	23	21	35	22	23	17	8
Pasture	9	73	10	4	38	9	2	92	10	5	69	19	8	63	9

Crop	SOUTHERN PLAINS			NORTHERN PLAINS			MOUNTAIN			PACIFIC			UNITED STATES		
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Corn	8	17	4	22	6	1	4	26	-	42	22	8	10	23	12
Cotton	6	22	6	-	-	-	22	26	1	17	36	1	25	28	17
Tobacco	-	-	-	-	-	-	-	-	-	-	-	-	49	106	76
Wheat	5	21	1/	1	18	1	4	27	1	21	3	-	5	25	11
Other close growing cash crops	2	15	1	2	13	3	91	37	1	66	16	1	14	14	4
Oats and barley	4	19	4	-	17	5	26	13	-	66	21	-	11	24	12
Sugar crops	-	-	-	3	77	-	16	49	3	71	27	8	32	32	8
Peanuts	4	20	4	-	-	-	-	-	-	-	-	-	11	31	17
Other large seeded legumes	2	37	2	-	-	-	3	59	1	50	30	6	5	27	13
Potatoes and sweetpotatoes	45	27	28	5	17	7	24	58	2	115	53	4	60	113	84
Hay	1/	44	1	3	32	3	2	41	1	8	49	5	4	49	10
All vegetables	25	60	14	11	29	35	41	26	3	89	67	24	40	61	32
Fruit and nuts	67	6	4	-	42	-	79	27	1	83	26	8	55	42	21
Other crops	4	22	3	-	22	22	34	24	1/	20	70	5	8	29	25
All crops	10	27	5	6	17	2	17	39	2	66	38	10	15	32	16
Pasture	1/	33	1	3	3	2	13	36	1	2	39	4	4	64	9

1/ Less than one-half pound per acre.

Table 17.- Estimated average rates of application per acre of the three principal plant nutrients combined on crops and on pasture, by regions, 1947

Crop	North-east	Corn Belt and Lake	Appa-lachian	South-east	Delta	Southern Plains	Northern Plains	Mountain	Pacific	United States
	Rate per acre of N,P_2O_5 and K_2O where applied									
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Corn	68	34	61	57	36	30	29	30	72	45
Cotton	--	37	83	88	54	34	--	49	54	70
Tobacco	266	96	228	265	--	--	--	--	--	231
Wheat	64	42	51	41	--	26	20	32	24	41
Other close growing cash crops	64	19	63	26	17	18	18	129	83	32
Oats and barley	60	50	58	34	33	27	22	39	87	47
Sugar crops	--	83	--	56	50	--	80	68	106	72
Peanuts	--	--	33	75	80	28	--	--	--	59
Other large seeded legumes	88	36	69	48	27	41	--	63	86	45
Potatoes and sweetpotatoes	485	149	290	127	191	100	29	84	172	257
Hay	79	52	92	56	46	45	38	44	62	63
All vegetables	214	88	85	185	55	99	75	70	180	133
Fruits and nuts	89	87	84	167	66	77	42	107	117	118
Other crops	93	68	75	114	20	29	44	58	95	62
All crops	116	42	86	78	48	42	25	58	114	63
Pasture	92	51	104	93	80	34	8	50	45	77

The rate per acre of plant nutrients applied on all crops taken together, was highest in the Northeast and in the Pacific regions. There was little difference in the rate per acre between these two groups of States. Higher analysis materials were used in the Pacific region as the rate of materials applied per acre was nearly 60 pounds less there than in the Northeast. Pasture ranks fifth or higher in terms of rate per acre of plant nutrients applied for the United States and for the Northeast, Appalachian, Delta, and Southern Plains regions.

SUMMARY OF FERTILIZER GRADES

Grades of fertilizer were classified in order to simplify the problem of indicating the frequency of use of those fertilizers that carry different percentages of the three principal plant nutrients--nitrogen, phosphoric acid, and potash. Main classes indicate the content of all three of these nutrients. Then subclasses were developed on the basis of nitrogen content (table 18). Thus a grade-class of fertilizer is a group of individual grades that are similar with respect to content of nitrogen and of total plant nutrients.

Fertilizer grades carrying 4 percent nitrogen and from 16 to 20 percent total plant nutrients were more commonly applied in 1947 than those falling within any other grade-class indicated.(table 19). Straight nitrogen materials carrying from 15 to 20 percent nitrogen were second in frequency of use.

Although only about one-third of all individual grades enumerated are included in the different grade classes in table 19, the grades not included in this table are of little importance quantitatively. Approximately 450 grades of fertilizer were identified in the survey. The 25 most important individual grades, based on the frequency of their enumeration, are shown in table 20. The rank of individual grades based on quantities used has been published annually since 1943 by the Bureau of Plant Industry, Soils and Agricultural Engineering.

SOURCE OF DATA AND METHODS

The schedule for the April 1948 enumerative survey conducted by the Bureau of Agricultural Economics included a section for collecting data on the use of commercial fertilizers and liming materials in 1947. The kind (analysis) and quantity of fertilizer used on farms, crops fertilized, and both the planted and fertilized acres of each crop receiving fertilizer on fertilizer-using farms, were recorded. Data were also obtained as to the quantity of liming materials used and the number of acres of cropland and of pasture that received applications. The size of the sample is shown in the tabulation below, and the grouping of States used in developing the estimates by regions, is shown in figure 1. The sample was not designed to furnish estimates by individual States.

Region and United States	Number of usable schedules
Northeast	1,705
Corn Belt and Lake States	3,023
Appalachian	1,770
Southeast	1,123
Mississippi Delta	1,052
Southern Plains	880
Northern Plains	677
Mountain	711
Pacific	979
United States	11,920

Two methods of expansion of the survey data were tested: (1) quantity per acre of cropland and of pasture and (2) quantity used per farm. 7/ BAE estimates of the acreage of cropland and of pasture were multiplied by these two items, respectively. Use of the second item, "quantity per farm", resulted in an estimate for fertilizer that was about 4 percent less than published data. Survey data for fertilizer were therefore used as a basis for estimating, by regions, the distribution of quantities previously published. 8/ In the case of lime, this procedure resulted in an estimate of tonnage used that exceeded by about 10 percent, the quantity reported as being applied under the Agricultural Conservation Program. It has generally been assumed that quantities applied under this program account for about 90 percent of the total used. Therefore, estimates of the use of lime developed on the basis of the survey were accepted for purposes of this report.

The percentage of survey farms using fertilizer and using lime on cropland and on pasture was applied to unpublished BAE estimates of the number of farms in the United States in order to obtain the estimates of the total number of farms in this country that used fertilizer and that used lime or cropland and on pasture in 1947 (table 1).

Estimates of the acreage and percentage of the land in crops fertilized were developed as totals of corresponding acreages for individual crops (tables 8 and 9). Pasture was of course treated separately in the same way as an individual crop (table 2).

In the case of lime, the percentages that crop and pasture acreages limed were of the total land in survey farms, were applied to a BAE estimate of all farm land, in estimating the acreage of crops and of pasture limed in the United States, in 1947 (table 2).

7/ Instructions contained in special memorandum 912 "Report on Examination of BAE April 1948 Sample" were followed in expanding data to regional and National totals.

8/ Agricultural Statistics 1949, table 694, minus gypsum and sulfur which were not included in the expanded survey data.

The survey tonnages of fertilizer and of lime applied on pasture were expressed as percentages of the total tonnages respectively on the survey farms. In the case of fertilizer, this percentage was then applied to the published data showing farm use of fertilizer in each region in order to calculate the tonnages of fertilizer used on pasture in the United States, in 1947. The residuals, then, became the estimated tonnages used on crops (table 3). In the case of lime, the calculated tonnage applied on cropland and on pasture was used as the final estimate of lime consumption.

Final estimates of the average rates of application of fertilizer on all crops and on pasture shown in table 4 were developed after estimating the distribution of fertilizer to different crops (table 5), and estimating the acreage of these crops fertilized as shown in table 9. In the case of lime, average rates of application per acre were obtained by dividing total tonnages (table 3) by total acreages (table 2). The final estimated rates per acre for lime are also shown in table 4.

Several checks were used in the process of developing the final estimates of tonnage of fertilizer used on individual crops, rates of application per acre, and acreages fertilized. Probably the most reliable estimates, developed directly from survey data, were those of rates per acre of fertilizer applied on the different crops. These data were developed directly from the answers of the respondents as to quantities used on stated acreages.

The most direct method of estimating the quantity of fertilizer used on each crop, by regions, was first to divide the survey tonnage used on that crop by the total survey tonnage, to derive the percentage of the survey tonnage that was used on each crop. These percentages, multiplied by the published tonnage of fertilizer used on farms, gave one set of estimates of the tonnages used on each crop. Another approach explored was to calculate the acreage of cropland on the survey farms (not given) by multiplying the acreage of land in farms (given) by BAE estimates of the percentage of land in farms that was represented by cropland. Then the survey acreage of each crop fertilized was calculated as a percentage of this estimated acreage of cropland, by regions. These percentages, multiplied by the BAE estimates of cropland in each region, gave an estimate of the acreage of each crop fertilized. This estimated acreage, multiplied by the rate of application per acre as derived from the survey, gave another estimate of the tonnage of fertilizer used on each crop. No data were available from the survey, as to the total acreage of the different crops on farms not using fertilizer in 1947, so it was not possible to calculate directly, for each crop, an estimate of the percentage of its acreage that received applications.

Using the different estimates of tonnages used on individual crops and of the acreages of these crops fertilized, in conjunction with the calculated rates per acre derived from the survey, it was possible through use of judgments based on observation and experience, to develop final estimates within the limits set by the fixed tonnages of fertilizer by regions, as shown by published data. The various final estimates by crops and regions; (1) tonnages of fertilizer applied, (2) rates per acre, and (3) acreage and percentage of acreage fertilized were thus adjusted simultaneously to agree with published tonnage data by crops and regions and to conform to informed judgments as to rates per acre and percentages of acreages fertilized. Major adjustments were required in relatively few cases, particularly with reference to rates per acre.

In estimating the application of plant nutrients (N, P_2O_5, K_2O) by crops and regions, a determination was made of the percentage of the total tonnage used on each crop, that was accounted for by each grade-class of fertilizer. This percentage applied to the total quantity of fertilizer used on a particular crop (table 5) gave the estimated quantities of fertilizer of each grade-class which were applied on that crop in the region. These quantities multiplied by the percentage of N, of P_2O_5, and of K_2O, respectively, in the representative grade for each grade-class gave the estimated quantities of each of these plant nutrients in each grade-class applied to that crop. Estimates of the total plant nutrients applied to each crop were then developed by adding the estimates of N, of P_2O_5, and of K_2O, respectively contained in each grade-class of fertilizer applied to that crop.

Table 18.- Grade classes of fertilizer based on percentage content of total plant nutrients and of nitrogen 1/

Main classes		Sub-classes	
Number	Total nutrient content	Letter	Nitrogen content
	Percent		Percent
1	Under 10	A	Under 2
2	10 to 15	B	2
3	16 to 20	C	3
4	21 to 25	D	4
5	26 to 30	E	5
6	31 to 35	F	6 to 9
7	36 to 40	G	10 to 14
8	41 to 45	H	15 to 20
9	46 to 50	I	21 to 30
10	51 to 55	J	31 to 45
11	56 to 60	K	46 to 65
12	61 and over	L	66 and over

1/ Any sub-class may be associated with any main-class within the limits of total nutrient content of the main-class.

Table 19.- Relative frequency of use of different grade-classes of fertilizer

Relative frequency of use 1/	Classes with content of:		Most common, or representative grade within each grade-class
	All nutrients	Nitrogen	
Percent	Percent	Percent	
100	16 to 20	4	4 - 12 - 4
63	16 to 20	15 to 20	16 - 0 - 0
62	16 to 20	2	2 - 12 - 6
55	16 to 20	0	0 - 20 - 0
50	16 to 20	3	3 - 9 - 6
46	16 to 20	5	5 - 10 - 5
42	21 to 25	3	3 - 12 - 6
30	16 to 20	6 to 9	6 - 8 - 4
25	21 to 25	4	4 - 10 - 7
23	26 to 30	3	3 - 12 - 12
19	31 to 35	31 to 35	32 - 0 - 0

1/ Most frequently used grade class = 100.

Table 20.- Individual grades of fertilizer ranked according to frequency of use, United States, 1947

Rank	Fertilizer	Relative frequency 1/
1	2 - 12 - 6	100
2	16 - 0 - 0	94
3	4 - 12 - 4	72
4	0 - 20 - 0	71
5	3 - 9 - 6	69
6	5 - 10 - 5	64
7	3 - 12 - 6	58
8	4 - 10 - 6	38
9	3 - 12 - 12	30
10	4 - 18 - 6	25
11	32 - 0 - 0	25
12	5 - 10 - 10	23
13	6 - 8 - 4	21
14	6 - 8 - 6	19
15	0 - 18 - 0	16
16	4 - 10 - 7	16
17	4 - 8 - 4	11
18	5 - 8 - 7	10
19	0 - 12 - 12	10
20	0 - 14 - 7	10
21	4 - 12 - 8	8
22	4 - 8 - 8	8
23	4 - 8 - 12	8
24	4 - 10 - 4	7
25	20 - 0 - 0	7

1/ Most frequently used grade = 100.